LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, July 8-12, 2013.

R&D AND THE WINNERS ARE...

Optics engineer Jason Chou won an R&D 100 for a new laser optics screening system.

Lawrence Livermore researchers are the recipients of five 2013 R&D 100 awards.

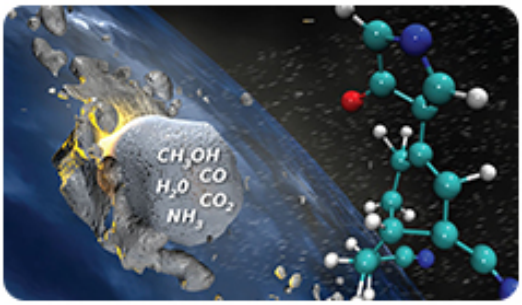
The technologies honored by *R&D Magazine* were developed by three teams of Lawrence Livermore scientists and engineers, a team of Lab physicists and two Lawrence Livermore computational scientists who worked with two other national labs, a British laboratory and a company.

With this year's results, the Laboratory has captured a total of 148 R&D awards since 1978. U.S. Department of Energy national laboratories received a total 36 awards in this year's judging.

This year's Livermore R&D 100 awards could provide assistance in fighting bioterrorism and improve indoor air quality in buildings, improve understanding of important material and biological processes, upgrade lasers for defense and industrial applications and boost fusion energy research.

To read more, go to *R&D Magazine*.

THE NEW YORKER **A SHOCKING RESULT**



Comets may have helped jump start life on Earth by delivering essential building blocks.

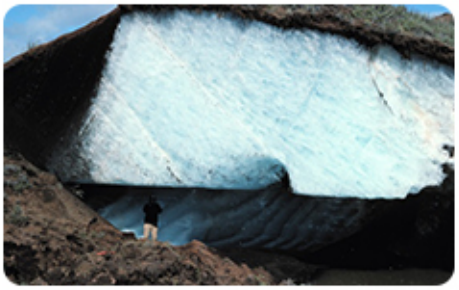
While many scientists believe life may have evolved from a primordial soup here on Earth, Lawrence Livermore's Nir Goldman has another idea: Comets may have brought the building blocks of life to Earth.

The problem is, when a comet smashes into Earth it more or less explodes. "The idea that it could successfully deliver organic material has been pooh-poohed," Goldman said. "Because the heat and pressure would burn everything up."

If these comets hit the planet straight on, they would have destroyed any organic molecules that they carried. But Goldman realized that perhaps 20 percent of the comets struck the Earth at shallower angles, which would have led to milder temperatures and shock waves. In theory, the organic matter would not only have survived but would have been converted into more complex molecules by heat and pressure.

To read more, go to *The New Yorker*.

PHYS.ORG **FRIEND OR FOE?**



Plants may actually warm tundra soil, threatening to thaw permafrost such as this cross-section view. Photo courtesy of Michigan State University.

Plants are normally allies in the fight to slow climate change because of their carbon-gobbling ability, but in the frozen North, the effects of thriving vegetation may push temperatures higher, becoming more of a foe than a friend.

In a series of climate simulations, led by Lawrence Livermore's Celine Bonfils, a group of researchers found that the spread of bushes, taller ones especially, could exacerbate warming in northern latitudes by anywhere from 0.6°C to 1.8°C per year.

In fact, taller species have the potential to warm tundra soil more deeply, threatening to thaw permafrost in some areas. That means more of the greenhouse gases now locked up by a year-round freeze could be released into the atmosphere, increasing warming even more.

"Until now, most climate model studies have only focused on the climate effects induced by a complete tundra-to-forest conversion," Bonfils said.

While warming could eventually lead to northward forest expansion, "we don't expect a full-scale conversion of tundra to forest anytime in the next century," said Tom Phillips, one of Bonfils's collaborators on the study, also of Lawrence Livermore. "More likely, you'll see shorter shrubs or new species that are taller moving in gradually."

To read more, go to Phys.org.

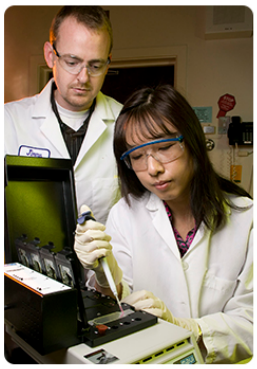
LLNL's Fred Streitz and Doug East show off the Vulcan supercomputer, which select industries will be able to tap.

Several supercomputing facilities are lending helping hands to bring high performance computing to industry -- and fresh efforts are springing up at Lawrence Livermore.

At Livermore, those selected as industrial users will have a crack at the five petaflop-Vulcan that sits at No. 8 on the recently updated Top 500 supercomputer list.

With 390,000 cores and a new host of commercial applications to tweak, Lawrence Livermore is providing a much-needed slew of software and scaling support. The Lab is lining up participants to step up to the high-core line to see how more computer horsepower can push modeling and simulation limits while solving specific scalability issues.

To read more, go to HPC Wire.



LLNL biologists Crystal Jaing and James Thiesen load a fluorescently labeled viral DNA sample onto the LLMDA.

A new technology developed at Lawrence Livermore with clever algorithms and a tiny microarray can identify thousands of pathogens in 24 hours.

This means that using the Lawrence Livermore Microbial Detection Array (LLMDA) for identifying viruses, bacteria, fungi and other disease-causing pathogens is faster and cheaper than other most methods.

The LLMDA rapidly identifies any known microbe whose genetic code has been sequenced by combining innovative bioinformatics with a microarray. Multiple pathogens are detected simultaneously, with typical processing times of less than 24 hours.

To read more, go to SPIE.
